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August 28, 1997

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Mr. Peter Cowhey
Chief, International Bureau
Federal Communications Commission
2000 M Street, N.W., Room 830
Washington, D.C. 20554

Re: NVNG MSS Proceeding, IB Docket No. 96-220

Dear Mr. Cowhey:

Pursuant to an informal request from Commission staff, Final Analysis Communication Services, Inc. ("Final Analysis"), by its attorneys, hereby submits this letter outlining its position with respect to a potential alternative spectrum band plan for the licensing of second round Little LEO systems as discussed at the August 11, 1997 meeting between the staff and the Little LEO industry. Following up on that meeting, the staff has asked the parties individually to submit a written description of their final positions on the alternative spectrum plan. Final Analysis undertakes herein to present a concise and accurate summary of its position.

As an initial matter, however, it must be noted that in its response to the staff's request filed on August 15, 1997, Leo One USA Corporation ("Leo One") persists in making gross mischaracterizations of Final Analysis's position. In fact, while the staff has asked for constructive input on its own position, Leo One spends fully 5 pages out of 6 perpetuating distortions of Final Analysis's views in a continued attempt to show how Final Analysis can be accommodated in the 137 MHz band. Leo One provides only a few lines of unsupported assertions as to why it should be assigned virtually all available spectrum in the 400 MHz band. A full refutation of all the inaccuracies raised in Leo One's letter is already in the record, but the following critical points should be noted:

* *Leo One misrepresents that Final Analysis now indicates that it could operate downlink channels in the 137 MHz band, as long as it has 4 channels in the 400 MHz band to "mitigate the perceived coordination risk of operating in the 137-138*

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MHz band and to preserve its so-called investment in subscriber equipment at 400 MHz band."[1] Final Analysis has never indicated on the record or in any meeting that its proposed full constellation can be accommodated with such an allocation. As explained further below, Final Analysis has said that such an allocation would permit implementation of only a seriously handicapped system, which Final Analysis would voluntarily accept only under certain conditions.

* *Leo One incorrectly argues that Final Analysis's stated requirements for service links in the 400 MHz band were only made clear as recently as March 1997.* In fact, Final Analysis made clear its preference for the 400 MHz band in its initial comments in the instant proceeding where this allocation was first described by the Commission and the time sharing requirements in both the 137 and 400 MHz bands were first proposed.[2]

* *Leo One falsely asserts that it is "impossible to believe" that Final Analysis has already invested in subscriber equipment in the 400 MHz band.* In fact, as Leo One knows, Final Analysis's actual prototype terminals were physically observed earlier this year by several of the Commission staff at the company's Lanham, Maryland headquarters and operational facilities, were on international display at last year's World Telecom Policy Forum in Geneva and are to be utilized in

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[1] Final Analysis has prepared charts, attached hereto as Attachment A, that depict the location of current government and private sector operations in these bands. As shown in the charts, timesharing with NOAA and Meteor would be required in the 137-138 MHz band. In addition, the 400-401 MHz band can be described as having at its center three sub-bands of roughly equal size in which VITA, the French S80 system and GE Starsys operate. This tripartite center of the 400-401 MHz band is sandwiched between two sub-bands in which DoD's meteorological satellites ("DMSP") operate.

[2] It is critical to recall that Final Analysis's and Leo One's original amended applications differ in a very important respect. Leo One initially proposed operations in segments of the 137 MHz band that overlapped with NOAA channels and therefore that Leo One must have assumed would be subject to time sharing. Final Analysis, however, based its original application and amendment on use of spectrum in the 137 MHz band on the selection of downlink service channels that avoided time sharing with NOAA. The Commission *subsequently* proposed that Final Analysis's selected channels be subject to time sharing limitations. Thus, because of the Commission's time sharing mandate, it would be impossible for Final Analysis to implement its original proposal. This is not true for Leo One, which makes its current position even more of a mystery.

connection with an experimental satellite that is fully constructed and ready for launch from Russia within the next few weeks.

* *Leo One wrongly claims that it is the only applicant prepared to implement near real time service.* This is absolutely false. Final Analysis has consistently maintained that near real time services are central to *its* business plan. It simply disagrees with Leo One's system design and marketing assumptions. To support Leo One at the expense of Final Analysis would merely put the Commission in the position of guessing that Leo One has the better technical and business plan. Final Analysis has always maintained that this is something that the market, not the Commission, should decide.

* *Leo One misstates the choice facing the Commission as between "precluding Leo One from implementing its system in favor of accommodating Final Analysis's request to leverage off its so-called "investment".*[3] Instead, Leo One is actually asking the Commission to give one applicant for a large system (Leo One) everything it now demands on the basis of bald assertions concerning business plan requirements, while relegating the other applicant for a large system (Final

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[3] As Final Analysis argued in its January 13, 1997 Reply Comments in this proceeding, at 36 n.59, Leo One misapplies the law when it claims that Final Analysis is somehow inappropriately trying to "leverage" from an experimental license to a commercial license. The Commission's rules and policies requiring an experimental licensee to proceed at risk go to the issue of whether a particular applicant may expect to receive a license. The policy does *not address* the current situation -- *i.e., the assignment of particular frequencies, already allocated to a particular service, to an individual applicant otherwise qualified to be licensed in that service.* Application of the law as proposed by Leo One makes no sense here. If Final Analysis is otherwise qualified to be licensed in either the 137 MHz band or the 400 MHz band, no purpose or public interest is served by assigning to Final Analysis the band that increases the cost of its system and assures a year or more of delayed implementation due to the requirement to redo terminal equipment R&D. In a proceeding aimed at bringing competitors quickly to market it makes no sense to license a competitor in a way that hobbles it. Especially when, as here, one party (Leo One) has made absolutely no technical, financial or other argument as to why it needs an assignment in the 400 MHz band, it is only reasonable, all else being equal, to assign to Final Analysis spectrum in the 400 MHz band that ensures the least expensive and quickest implementation in the market. There is nothing in Commission rules or policies that precludes such a common sense approach.

Analysis) to a handicapped band allocation which may prevent implementation of a commercially or technically viable system.

Leo One tries to obfuscate the point that Final Analysis has been steadfast since the beginning of this proceeding that its requirement for service downlinks in the 400 MHz band is a combined result of the Commission's proposal to require time sharing in the 137 MHz band, which significantly decreases the utility of that spectrum, and its perfectly justifiable desire to enter the market with cost effective subscriber equipment that it has already designed for use in the 400 MHz band. It is Leo One, not Final Analysis, who has repeatedly and vigorously argued that the 137 MHz band may be easier to coordinate than the 400 MHz band, is useful for implementation of near real time services and is amenable to design of cost effective subscriber terminals. In light of its strong views on those issues, and in the absence of one shred of evidence as to why it must use the 400 MHz band, Final Analysis submits that Leo One should be licensed to operate in the 137 MHz band.

I. CERTAIN RECENT DEVELOPMENTS PERMIT IDENTIFICATION OF AN ALTERNATIVE ALLOCATION

In light of additional spectrum made available due to GE Starsys's withdrawal of its Little LEO operation from the 400-401 MHz band, at the August 11 meeting the staff and the industry discussed the following alternative two-system band plan to accommodate remaining second round applicants:

SYSTEM 1. System 1 would use a 50 kHz segment of the 149.9-150.05 MHz Transit Band for feeder uplink operations.[4] Service uplink operations would be performed in the 148-149.900 MHz band using DCAAS. For downlink operations, System 1 would use the two DoD sub-bands in the 400-401 MHz band.

SYSTEM 2. System 2 also would use a 50 kHz segment of the 149.9-150.05 MHz Transit Band for feeder uplink operations. Service uplink operations would be performed in the 148-149.900 MHz band using DCAAS. Downlink operations

[4] 150 kHz in the Transit Band 149.900-150.05 MHz would be divided into the following three 50 kHz segments: (i) 149.900-149.950 (currently unavailable because reserved to the French S80 system); (ii) 149.950-150.00 MHz; and (iii) 150-150.050 MHz. Leo One and Final Analysis would be allowed to utilize one of the two 50 kHz segments of the Transit Band for feeder uplinks.

in System 2, however, would utilize the 137-138 MHz band on a timeshared basis with NOAA and Meteor, and would use the two non-DMSP sub-bands in the 400-401 MHz band made available, respectively, by timesharing with VITA, and due to the withdrawal of GE Starsys.

If the Commission proceeds to eliminate first round applicants and if the second round application of CTA is excluded through the proposed affiliate rule in light of that company's acquisition by Orbital Sciences Corporation, the parent of first round licensee ORBCOMM, this plan would have to accommodate only Leo One, E-SAT and Final Analysis.

II. CERTAIN ACCOMMODATIONS MUST BE MADE FOR SYSTEM 2 TO BRING IT INTO ROUGH PARITY WITH SYSTEM 1 AND TO PERMIT LICENSING OF TWO LARGE SYSTEMS.

Final Analysis's "bottom line" is that it has applied for and desires a license for a large Little LEO system capable of serving a variety of market segments, including near real time services as well as intermittent services.[5] All of the statements made by Final Analysis on the record and in *ex parte* communications in this proceeding are grounded in this objective. The position Final Analysis takes with respect to the System 1 and 2 alternative are no exception. Final Analysis repeats unequivocally that it wants a license for a large constellation.

Final Analysis believes that any allocation based upon the discussed Systems 1 and 2 alternative must include certain conditions or accommodations that bring both systems into rough parity and allow eventual implementation of large constellations offering near real time service in each. Only under such circumstances does Final Analysis believe that it would be acceptable to receive a license for either System 1 or System 2. If the Commission does not establish two essentially fungible systems to accommodate two large constellations, it might as well establish two systems, one entirely in the 400-401 MHz band and the other in the 137-138 MHz band, and anticipate that mutually exclusive applications will be filed by Leo One and Final Analysis for large constellations in the 400 MHz band.

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[5] The ultimate market segment for Little LEO systems involves near real-time applications such as asset and vehicle tracking and monitoring, emergency environmental hazard alerts and personal messaging services. Such near real-time applications will not tolerate coverage outages. In contrast, certain intermittent, non real-time applications such as automatic meter-reading can tolerate a degree of coverage outages.

In order to fully understand Final Analysis's position in this regard, it is important to be clear as to why System 2 is seriously handicapped and why special accommodations are required. The following are critical features of the System 2 allocation which would prevent implementation of a full constellation offering near real-time service:

* Use of the 137 MHz band would require not only time sharing and/or coordination with NOAA but also with ORBCOMM, E-Sat, Meteor, S80 and eventually with EU Metsat and China Metsat.[6] Consequently, 137 MHz spectrum is most useful, under current constraints, coordination and technology, for feeder links and gateways.

* Spectrum in the 137 MHz band (VHF) also is generally less attractive for service links compared to spectrum in the 400 MHz band (UHF) due to the larger size of antenna required. This has broad impact on the marketability of services which in competitive markets rely on increasingly small and compact customer terminals.[7]

* Reliance upon non-DMSP spectrum for service downlinks permits System 2 to have only 2 service channels (one each in the vacated GE Starsys sub-band and the timeshared VITA sub-band). Possibly 4 channels could be used, at least temporarily, assuming successful recoordination with France for use on a non-interference basis of other non-DMSP spectrum in the S80 sub-band.

* Restriction of the system to 2-4 service channels and most likely a reduced number of satellites would restrict the system to intermittent services. In effect, System 2 as outlined by the staff, in the absence of the special conditions discussed below, would accommodate only a small constellation serving intermittent market segments, which is not acceptable to Final Analysis.

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[6] ORBCOMM is licensed to the 137 MHz band but has the advantage of use of dedicated spectrum, and therefore does not have these coordination obligations.

[7] In its original application, Final Analysis was willing to accept the limitations of the VHF band because it requested assignment in spectrum that was assumed to be dedicated. However, pursuant to the Commission's proposal in this proceeding, use of the 137 MHz band would require Final Analysis to accept two market handicaps: time sharing and large antennas. In contrast, in its original application Leo One apparently accepted both handicaps as it applied for use of spectrum that overlapped with NOAA's channels and which Leo One must have presumed would require timesharing with NOAA.

* The fact that System 2 may be useful in the foreseeable future only for intermittent services accentuates the need to ensure compact and least cost terminals. Utilities, in particular, desire an integrated metering unit. The use of VHF terminals with larger antennas would result in less attractive terminals and higher implementation costs. In such a circumstance, an increased per meter cost of even just a few dollars would have a significant impact on the affordability of the service. This is made even more critical by the fact that these market segments have many terrestrial competitive substitutes. Thus, any Little LEO entrant reliant upon these services *must* be certain that they can be provided as inexpensively as possible. To do otherwise would risk market failure.

In light of these factors, Final Analysis has recommended to the staff that Systems 1 and 2 be defined as follows:

UPLINK OPERATIONS AND DCAAS. Both Systems 1 and 2 would use the 148.00-149.90 MHz band for service uplink operations. Feeder uplink operations for System 2 would be in the 149.90 - 149.95 MHz band on a non-interference basis to S80, and in the 149.95 - 150.00 MHz band on a dedicated bases. Feeder uplink operations for System 1 would be in the 150.00 - 150.05 MHz band on a dedicated basis.

DOWNLINK OPERATIONS: System 2 would utilize spectrum in the 137-138 MHz and 400-401 MHz bands for downlink operations in the following manner:

137-138 MHz Band. The 137-138 MHz band would be used for downlink operations on a timeshared basis with NOAA and Meteor.[8] ORBCOMM may have access to additional channels requested in the 137 MHz band but *only* if and when additional international allocations are made *and* System 2 licensee has transitioned to alternative spectrum. The System 2 licensee should have the flexibility to determine whether to utilize the spectrum for feeder and/or service links, depending upon developments in technology.

400-401 MHz Band. System 2 would timeshare with VITA in its sub-band in the 400-401 MHz band and would use the sub-band made available with

[8] Feeder and service downlink operations on a time-shared basis would be divided into the following sub-bands: 137.0000 - 137.1875; 137.2625 - 137.4225; 137.4725 - 137.5350; 137.5850 - 137.6505; 137.7405 - 137.8025; and 137.8175 - 138.0000, subject to coordination with NOAA, Meteor and ORBCOMM.

the withdrawal of GE Starsys. In addition, subject to necessary coordinations with France, System 2 would use the S80 sub-band on an exclusive basis until such time as the French system is launched and on a non-interference, time shared basis after the S80 launch.[9]

SPECIAL CONDITIONS: Because of the increased risk and the attendant reduction in system availability in reduced service downlink spectrum to only 2-4 channels in the 400-401 MHz band, the System 2 licensee must be guaranteed an exclusive first priority on any spectrum subsequently allocated internationally to Little LEO use. System 1 should receive a second priority. These priorities should ensure the respective licensees of additional spectrum as required to implement their originally proposed full constellations. In fact, Final Analysis believes that the market risk of deploying a limited system in System 2 at the outset is justifiable only if the Commission recognizes an exclusive priority to the System 2 operator on acquisition of additional spectrum as it becomes available in the future.

These conditions are justified on a technical basis because they would allow the System 1 and 2 licensees to immediately initiate systems, albeit significantly reduced for System 2, and to implement full constellations as additional spectrum becomes available through international allocations. Moreover, Final Analysis believes that receiving a priority on any after-acquired spectrum is critical from a business perspective because, without it, it will be difficult to justify to capital markets the initial risk of deploying a handicapped non-real time Little LEO system.

If the Commission were to adopt the System 1 and 2 band plan as identified herein, including the special conditions -- pursuant to which Final Analysis believes it would be assuming a reasonable risk of being able to implement its full constellation -- Final Analysis would accept a license for a large constellation in either System. Final Analysis takes this position, which does involve a significant amount of risk, only for the sake of facilitating a swift resolution to this proceeding that allows the participants to focus as quickly as possible on actual implementation of their systems.

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[9] Even if the FCC does advocate use of the S80 sub-band for U.S.-licensed Little LEOs internationally, there is no guarantee that the French will agree to open up that sub-band to such use. If the S80 sub-band is not made available, there would be only a maximum of 2 channels (rather than 4) available in System 2 for downlink operations in the 400-401 MHz band.

III. ALLOCATION OF SPECTRUM AS REQUESTED BY LEO ONE WOULD GIVE IT AN UNNECESSARY WINDFALL.

Final Analysis and the other second round applicants have previously agreed to significant accommodations in order to find a resolution for this proceeding that would accommodate all second round applicants.[10] In contrast, Leo One has been consistently inflexible and unwilling to compromise in this proceeding. Moreover, rather than pursuing an industry solution, Leo One has assiduously pursued a strategy that it believes will gain it all it desires, regardless of the harm to other competitors and applicants. In fact giving Leo One everything it wants in this proceeding guarantees it a windfall, because the concomitant effect would be to deny other applicants, particularly Final Analysis, the opportunity to be effective competitors.

Leo One claims in its August 15 *ex parte* that it has stated on "numerous occasions since [its] application was filed in October 1993" that it is "prepared to implement a near real time Little LEO system in the existing allocations."[11] Leo One also alleges that it is the only company that "has consistently demonstrated throughout this proceeding" that it will serve near real time markets,[12] and that it is essential that it receive all of the DMSP channels as well as 35 kHz in one of the non-DMSP 400 MHz channels to obtain sufficient system availability through its "frequency hopping" technique.[13]

Conspicuously missing from these arguments are any substantive reasons to support its insistence that its own near real time system be placed in the 400 MHz band

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[10] *See* Memorandum from CTA Commercial Systems, Inc., E-SAT, Inc., Final Analysis Communication Services, Inc., GE Starsys Global Positioning, Inc. Orbital Communications Corp., Volunteers in Technical Assistance, to Ruth Milkman, Deputy Bureau Chief, International Bureau, FCC, filed in IB Docket No. 96-220 on April 11, 1997 ("Industry Band Sharing Plan").

[11] *See* Leo One *ex parte* at 5.

[12] As argued above, this assertion is false.

[13] *See* Industry Band Sharing Plan at 1, 5. Leo One asserts that it only needs 35 kHz of a 46.7 kHz non-DMSP channel, but for all practical purposes such use would effectively occupy the channel and render it unusable by another licensee.

spectrum.[14] All of its reasons are based on its desire for availability rather than the need to satisfy particular service characteristics. Leo One only claims that without the capability to "hop" between DMSP and non-DMSP channels in the 400 MHz band, it would suffer a "cliff effect" preventing it from serving emergency customers that it estimates will constitute 60% of its projected total revenues and making implementation of its proposed system non-viable.[15] However, as discussed below, Leo One could avoid this problem and achieve the same capacity and availability that it claims it would enjoy in the 400 MHz band by utilizing a combination of 137 MHz spectrum, as it originally proposed, and the VITA band.

System Capacity. Leo One can now be licensed for all the spectrum it applied for in its original application. In particular, Leo One requested in its original application 8 service downlink channels of 25 kHz each (*see* Leo One Application at 18 Fig. IX-1 "Leo One USA Frequency Plan"[16] and chart prepared by Final Analysis depicting Leo One's frequency plan, attached hereto as Attachment D). Each of the ATP or TIP channels (plus guard band) provides a minimum of 50 kHz of spectrum which (each) can accommodate two of the Leo One channels (2 x 25 = 50 kHz). Therefore, the four ATP and TIP channels can accommodate

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[14] Leo One also does not explain why it is now so dependent upon near real time service when its amended application on file indicates a market plan based on a limited, store-and-forward system that would not require continuous contact with its gateway. *See* Attachment B hereto, which includes excerpts from Leo One's September 1, 1994 application (not modified by Leo One's subsequent amendment.) Finally, Leo One does not explain why it must have near real time capability immediately when it will not even have enough satellites in orbit to support such a service for the next four years or so.

[15] Leo One's "Chicken Little" claim that the sky will fall if its current business plan is not implemented is simply not credible. In the first place, as ORBCOMM has stated on several occasions on the basis of its own experience, international coordination and changes in technology will require all Little Leo licensees to modify their business plans to some extent. In the second place, Leo One has already changed its position several times in this proceeding. For example, in its original application it proposed to rely most heavily on store and forward services, not near real time services. It also stated its intentions to implement an experimental system, which it has never done. Leo One proposed in its application to implement a two-satellite experimental program as "an integral part of its business plan" but has failed to carry out that proposal. *See* Leo One Application at 3 and Appendix K, Exhibit 1 at 5, attached hereto as Attachment C.

[16] It should be noted that Leo One subsequently modified its inter-satellite link requirement.

the total 8 channels that Leo One has requested for service downlinks.[17] Moreover, Leo One could use NOAA outer bands (137.025-137.175 and 137.825-138.0) for feeder link operations.

System Availability. Leo One has repeatedly suggested that it needs both the DoD and the non-DMSP VITA portion of the 400-401 MHz band to do "frequency hopping."[18] Leo One has never offered a particular reason why it needs the 400-401 MHz band for its target near real time services.[19] If the need for the use of 400 MHz spectrum relates purely to availability, Leo One has not shown why it could not achieve the same result through "frequency hopping" on its system using VITA's portions of the 400-401 MHz band and the NOAA 137-138 MHz Band, rather than the DoD portion of the 400-401 MHz band. Leo One's own analysis shows that the outage caused using DoD or NOAA spectrum is the same.[20] If the outage is the same, then it does not matter whether Leo One uses the DoD portion of the 400-401 MHz band or the NOAA spectrum in combination with the VITA band. System availability is the same in either case.

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[17] As mentioned above, Leo One designed its system from the beginning so that some of its channels overlap NOAA channels and time sharing with NOAA would be unavoidable. In contrast, Final Analysis has been careful in its amended application to avoid overlap (and therefore time sharing) with NOAA.

[18] *See* Leo One *ex parte* at 1.

[19] It should further be noted that Leo One incorrectly states that Final Analysis's "decision not to frequency hop would constitute a less efficient use of the 400 MHz band and would waste valuable spectrum." Leo One *ex parte* at n.10 (quoting Response of Final Analysis Communication Services, Inc., filed in IB Docket No. 96-220 on January 16, 1997, at 3). Leo One's quotation omits to mention a critical footnote 6 from the quoted text of Final Analysis's response which explains that Final Analysis believes that use of frequency hopping capability in the user terminal receivers would be prohibitive. In contrast, frequency agility is built into Final Analysis's satellites while the user terminals are built for only one receive frequency to maximize affordability and reliability of service, especially for price-sensitive market segments, consistent with "widely accepted market analyses as well as affordable terminal principles espoused at the 1996 International Telecommunications Union World Telecommunications Policy Forum on Global Mobile Personal Communications by Satellite." *See* Final Analysis Response at n.6.

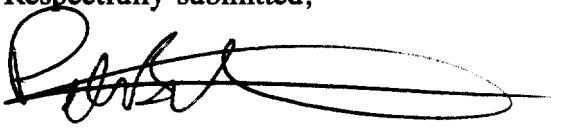
[20] *See* Comments of Leo One filed in IB Docket No. 96-220 on December 20, 1996 at App. E, p. 16, 20, Tables 1 & 2.

Furthermore, Leo One suggests in its latest *ex parte* that it is simple to design and develop equipment that can operate in the 137-138 MHz NOAA band. For instance, Leo One suggests that it would be easier to coordinate operations with NOAA METSAT in the 137-138 MHz band than with the tactical military assets of the Air Force in the DoD 400-401 MHz band.[21] If that is the case, then it should be a simple matter for Leo One to use the 137-138 MHz NOAA band, in addition to the VITA band, for "frequency hopping" and it has not explained why it must use both the DoD and non-DMSP VITA portions of the 400-401 MHz band for frequency hopping.

IV. CONCLUSION

For the foregoing reasons, Final Analysis urges the Commission to implement a two-system band plan with the special conditions to create parity in System 1 and System 2 licenses as delineated above. The Commission may then request further amendments by the second round applicants and make assignments, as appropriate, on the basis that the systems are essentially fungible. This approach will allow the immediate deployment of the parties' system proposals without the necessity of a comparative selection process. In light of the significant settlement efforts made by Final Analysis, as well as other second round applicants, the Commission should not allow Leo One's unwillingness to compromise to delay any further the licensing of Little LEO systems and deprive the public of the benefits of Little LEO services.

Respectfully submitted,



Aileen A. Pisciotta
Peter A. Batacan
Counsel to Final Analysis
Communication Services, Inc.

Attachments
cc: Service list

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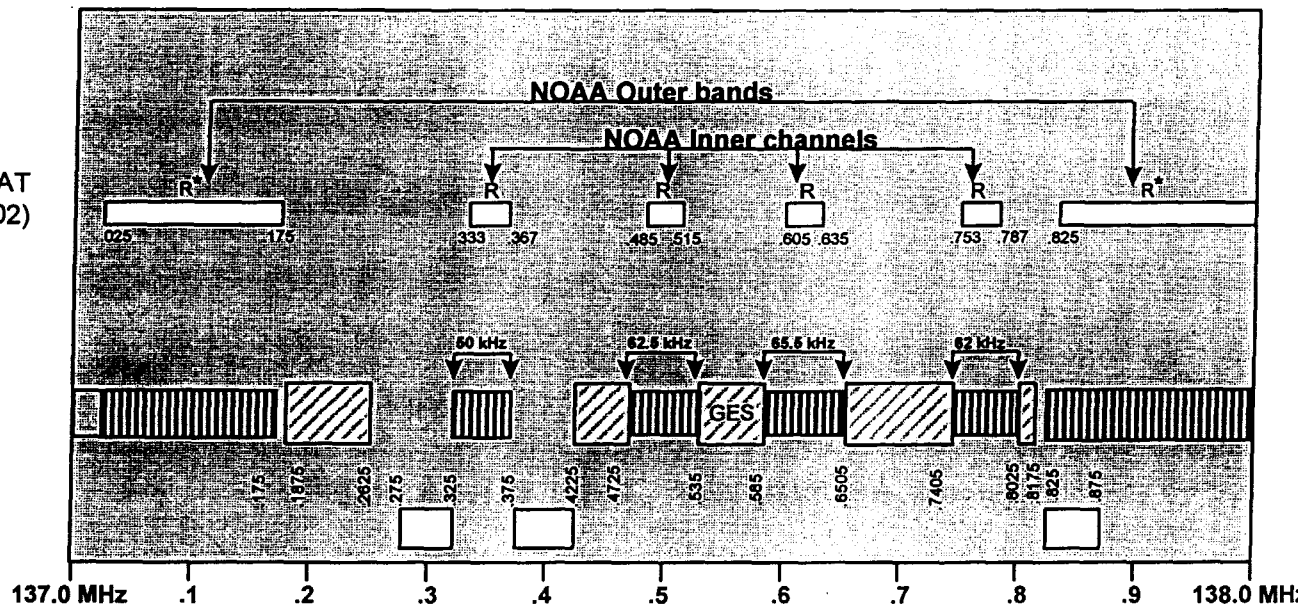
21 *See* Leo One *ex parte* at 4-5.

ATTACHMENT A

FINAL ANALYSIS

137.0 - 138.0 MHz Downlink Band

NOAA METSAT
EUMETSAT (from 2002)



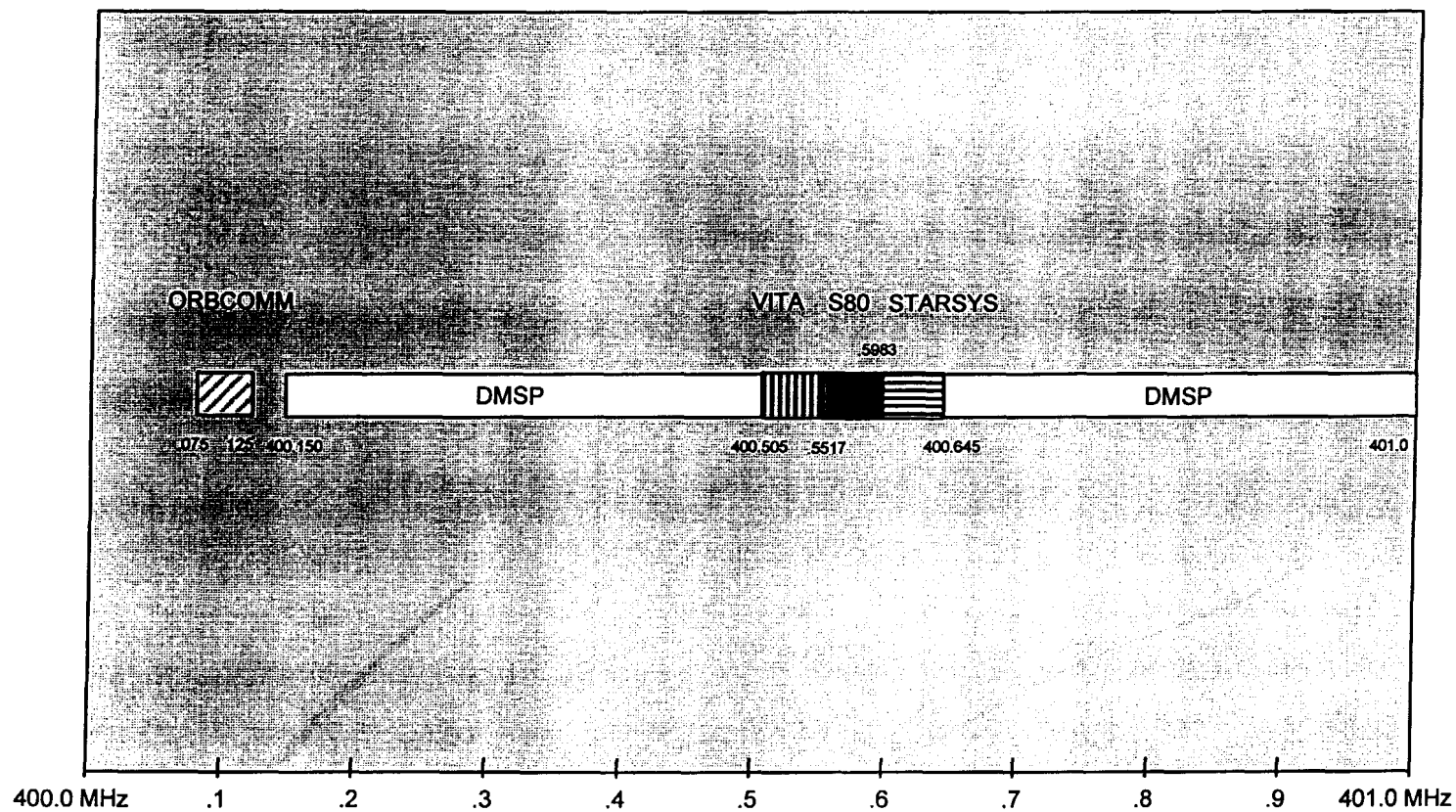
ORBCOMM (MODIFIED)

METEOR

TIME SHARED

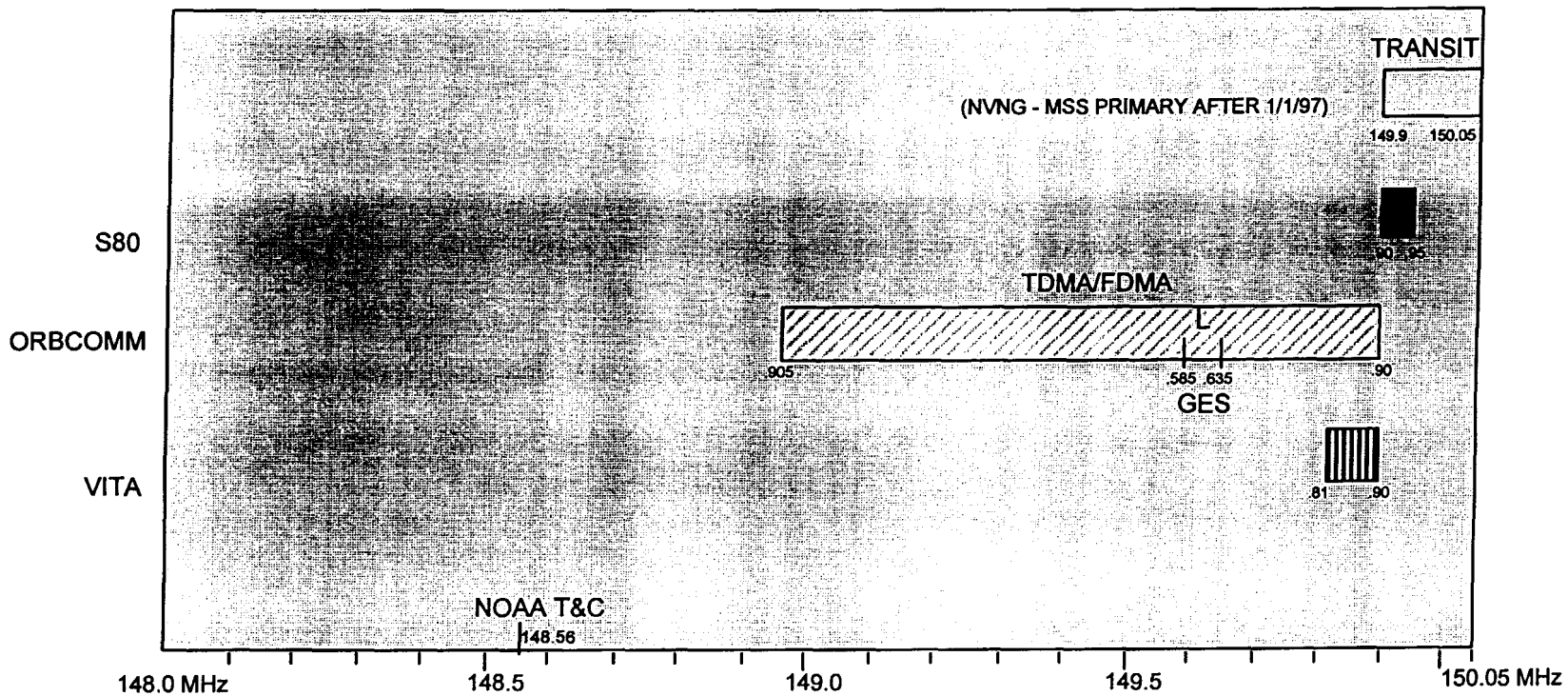
FINAL ANALYSIS

400-401 MHz Downlink Band



FINAL ANALYSIS

148.0 - 150.05 MHz Uplink Band



ATTACHMENT B

I. Introduction

Leo One USA is a new Delaware corporation which was formed to pursue business opportunities in the NVNG MSS. David A. Bayer, who has been involved in the field of mobile communications since the early 1970s, has ultimate ownership and control of the applicant. Mr. Bayer has had considerable experience developing and managing major paging and cellular operations, principally in the St. Louis, Missouri metropolitan area. In recent years, Mr. Bayer has explored the potential markets for advanced mobile communications systems, such as personal communications services (PCS). In conjunction with his interest in terrestrial based mobile communications, Mr. Bayer has decided to pursue opportunities for satellite-based mobile communications through the NVNG MSS. As is described more fully below, Leo One USA proposes to offer low cost data services for mobile users throughout the U.S.

The Leo One USA satellite system will consist of forty-eight satellites organized into four planes of twelve satellites each. The satellites will weigh approximately 154 kilograms (340 lbs.) and will operate in a circular low-Earth orbit at an altitude of 950 kilometers (513 miles). This system will provide store-and-forward data services to users around the world.

The Leo One USA satellite system will be distinguished by the range of services offered, the low cost of its service options relative to those offered by similar

- Power Subsystem (generating, storage, conditioning, distribution)
- Satellite Structure
- Propulsion Subsystem
- Thermal Control Subsystem

The design lifetime for the Leo One USA satellites is five years with sufficient consumables for seven years of operations.[1]

The satellites will be designed so that groups of satellites on their own carriage dispenser can be deployed using any of several candidate operational launch vehicles, such as Delta, Pegasus, Long March, Tsyklon and Kosmos rockets, or using other launchers currently in development, such as Lockheed's LLV-1. Also, each Leo One USA satellite will be designed to permit single satellite launches using one of the potential smaller vehicles, such as the operational START launcher and planned vehicles such as the Minuteman II SLV and Pac Astro launchers.

The Leo One USA spacecraft are designed as processing satellites. They will not use conventional bent pipe transponders; instead, they will demodulate and decode all received data packets. The decoded packets will be stored in digital memory. At the appropriate time, the packets will be encoded, modulated, and retransmitted.

[1]Leo One USA has analyzed the issue of potential orbital debris from this proposed system and determined that the design of the satellites and the proposed constellation orbits will minimize any potential problem.

IV. Earth Segment Description

The earth segment of the Leo One USA system will consist of transceivers and gateway earth stations. The gateways will provide access to and from the terrestrial telecommunications network, and will act as packet relay and regional control stations. One gateway will be designated as the primary tracking, telemetry, and control (TT&C) earth station. This gateway will be collocated with the Leo One USA network operation control center (NOCC). Additional gateway terminals will be equipped to provide back-up TT&C and NOCC functions in the event of a catastrophic failure of the primary TT&C and NOCC site.

Two primary gateways are currently planned in the continental United States (CONUS): one in the southwest and one in the southeast. Additional gateways, for service outside the United States, will be located in the territories of various other administrations working with or purchasing service from the Leo One USA network.

As a result of the store-and-forward nature of the Leo One USA satellites, continuous contact with a gateway will not be required. The gateways will poll the satellites and assign one of the three possible downlink channels to the satellite to initiate data transfer. They will have the ability to predict when each satellite will appear above a 15° elevation mask angle and will use open loop pointing of the gateway antenna to acquire and follow the satellite. The gateways will estimate the satellite signal Doppler shift to minimize acquisition

ATTACHMENT C

Potential for Success

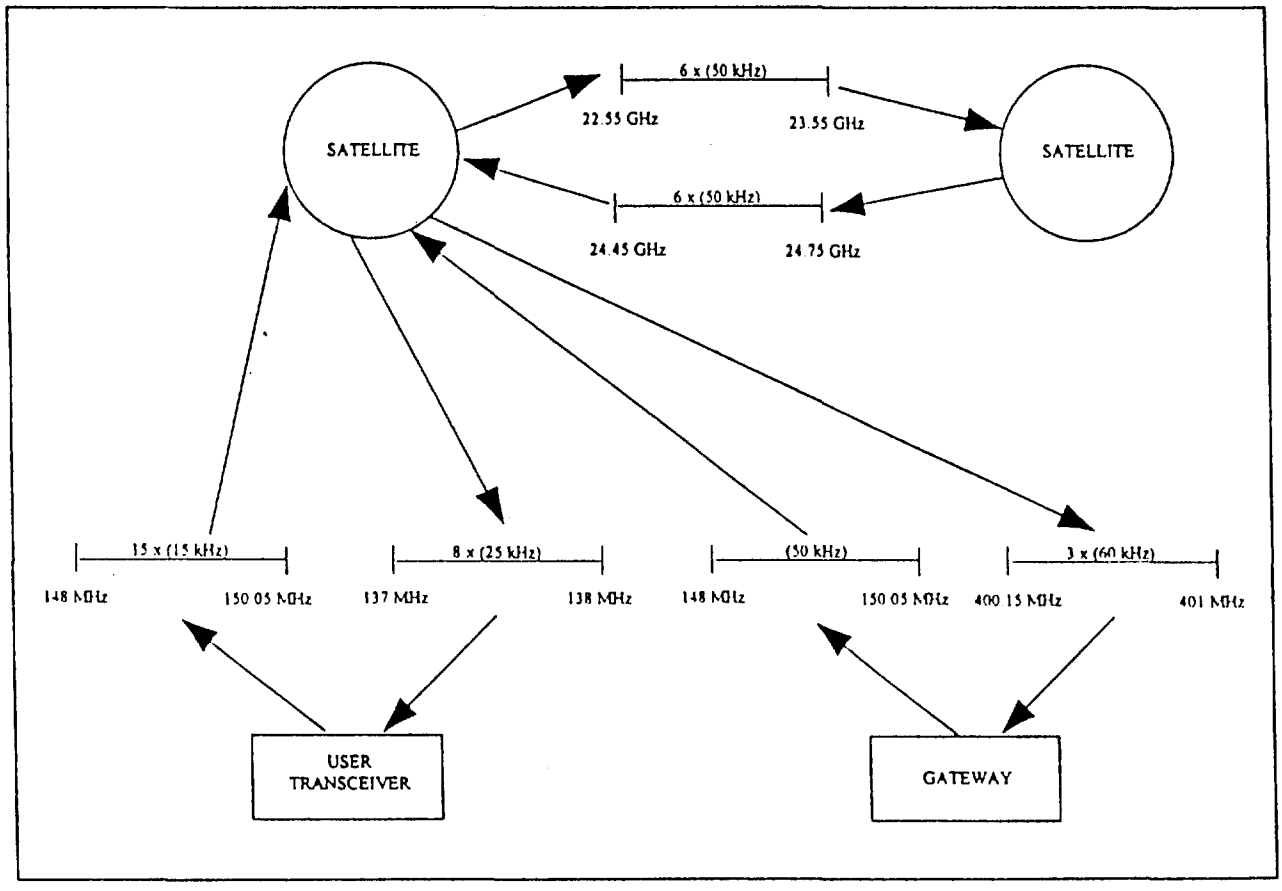
Leo One USA is committed to the successful deployment of an exciting new communications service. The experimental verification of this service is an integral part of the business plan and Leo One USA is confident that it will be achieved with results that will not only contribute to the radio art in general, but also will ensure that the best quality and range of services are available in the most timely manner to the public.

ATTACHMENT D

Inter-Satellite Link (ISL):

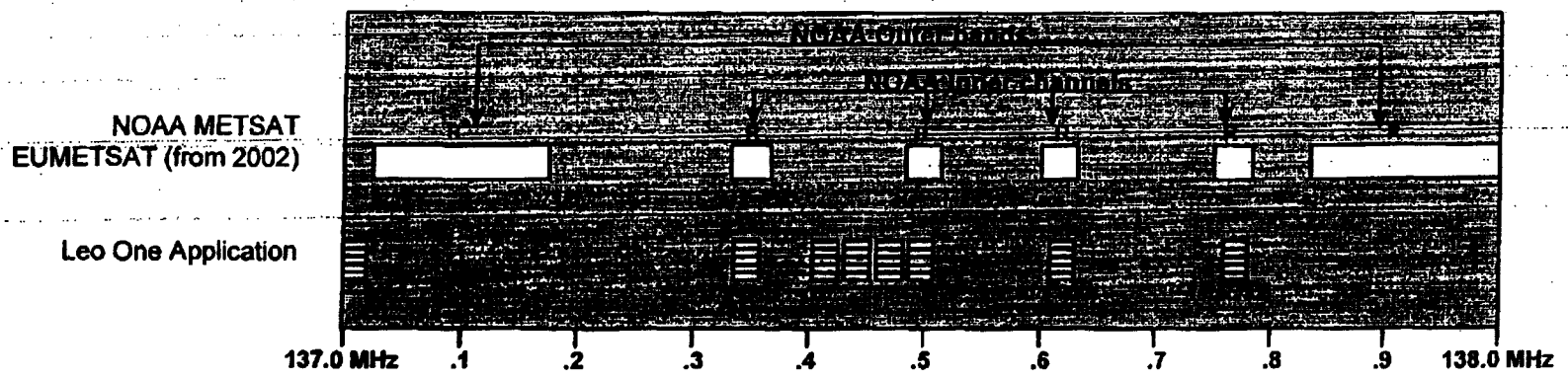
These links will operate in the 22.55-23.55 GHz and the 24.45-24.75 GHz bands, and will require six 50 kHz channels in each of these bands.

Figure IX-1 - Leo One USA Frequency Plan

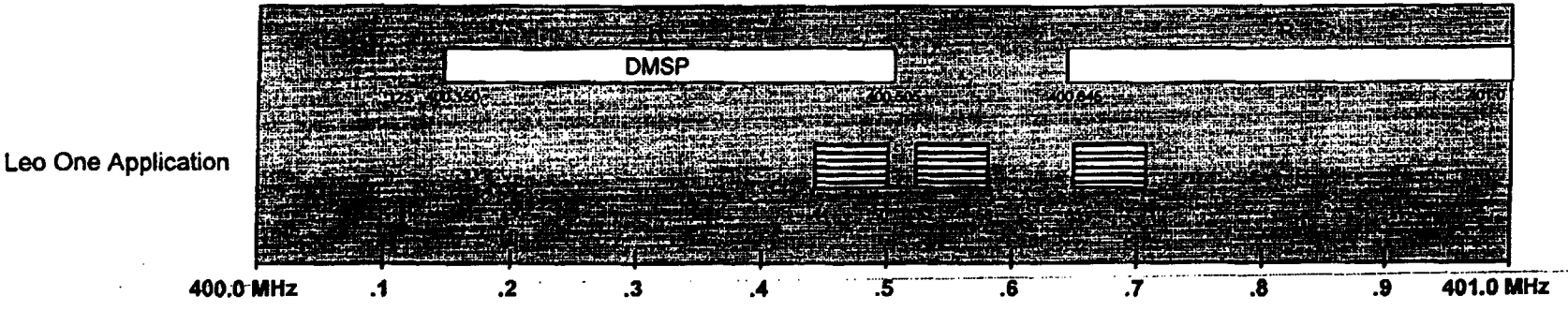


FINAL ANALYSIS

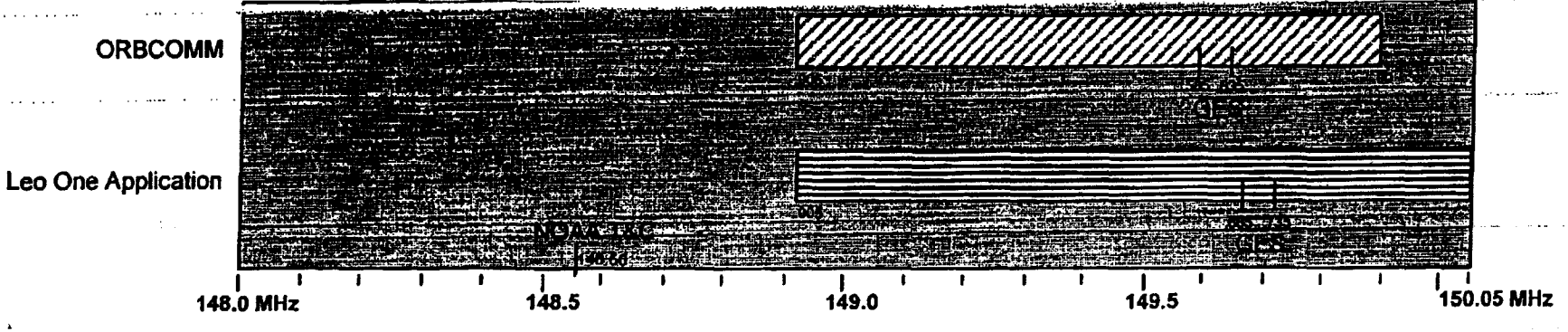
137.0 - 138.0 MHz Downlink Band



400-401 MHz Downlink Band



148.0 - 150.05 MHz Uplink Band



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